

EX. A

GEORGE T. HANSON, PHD

Technology Development
Invitrogen Corporation
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OBJECTIVE To obtain a career that will advance the science of drug discovery.

EDUCATION

- 1997 – 2001 Ph.D. in Chemistry
Institute of Molecular Biology and Department of Chemistry
University of Oregon, Eugene, OR
Dissertation title: *Green Fluorescent Protein Biosensors*
- 1993 – 1997 B.S. in Biochemistry and Molecular Biology
Department of Chemistry
University of Minnesota, Duluth, MN

PROFESSIONAL EXPERIENCE

- 2003* – present Senior Scientist, Invitrogen Drug Discovery Solutions, Madison, WI
*Invitrogen acquired PanVera on March 28, 2003
- Managed and guided associate scientists and graduate school interns
 - Started the Molecular Probes™ fluorescent protein biosensor program
 - Recognized as a pioneer within Invitrogen for developing productive cross-site collaborations
 - Served as scientific resource/sounding board for technical inquiries and discussions relating to fluorescence, FRET, TR-FRET, reporter genes, cell signaling and GPCRs for scientific staff and senior management
 - Established or maintained collaborations with Paul Selvin, Illinois (single molecule studies), Donald Zack, Johns Hopkins (high-content screening applications) and Alan Verkman, UCSF (cell signaling studies)
 - Developed cell-based assay detection systems for the beta-lactamase reporter gene
 - Known as the, 'Green Fluorescent Protein expert' within Invitrogen
- 2002 – 2003 Scientist, PanVera, LLC, Madison, WI
- Developed multiplexed fluorescence polarization-based HTS assays for nuclear receptors and kinases
 - Served as lead scientist on protein labeling methods using fluorescent reagents, including FIAsh & ReAsH (Lumio™ technology)
- 2001 – 2002 Post Doctoral Fellow, Molecular Probes Inc., Eugene, OR
- Initiated development of Ser/Thr and Tyr kinase assays using fluorescent substrates and specific kinase inhibitors
 - Assisted development of multiplexed proteomics platform by analytically evaluating phosphoprotein gel stain chemistry, Pro-Q Diamond
 - Examined the differences between cancerous and healthy cells by 2-D gel electrophoresis

PROFESSIONAL EXPERIENCE, CONT.

- 1998 – 2001 Research Assistant, Dept. of Chem., University of Oregon
- Developed pH and redox sensitive Green Fluorescent Protein variants
 - Established collaborations with Roger Y. Tsien, UCSD (GFP applications), Steven G. Boxer, Stanford (GFP excited state kinetics), Marshall H. Montrose, Indiana (multi-photon microscopy) and Roderick A. Capaldi, Oregon (mitochondrial disease models)
 - Performed the necessary molecular biology, cell biology and X-ray crystallography to relate protein structure to biological function
- 1997 – 1998 Teaching Assistant, Dept. of Chem., University of Oregon
- Lead general chemistry laboratory by instructing, teaching and evaluating students performance in the principles of general chemistry
- 1995 – 1997 Research Assistant, Dept. of Chem., University of Minnesota
- Performed PCR, Western/Northern blots, mammalian cell culture and a variety of other basic laboratory techniques to better understand ACTH receptor function in rat lymphocytes

HONORS & AWARDS

- 2004 – 2006 National Institutes of Health grant reviewer for the NIH roadmap initiative: "Assay Development for High Throughput Molecular Screening" Washington, D.C. (RFA-RM-06-004).
- 2004 Best Product Developed from a Cross-Site Collaboration – Lumio™ Technology, Invitrogen Innovation Awards
- 1998 – 2001 National Institutes of Health Training Grant, University of Oregon
- 1996 – 1997 Undergraduate Research Opportunities Program Scholarship, University of Minnesota
- 1996 NCAA All-American in Track & Field, University of Minnesota
- 1995 – 1997 Dean's List, College of Science & Engineering, University of Minnesota

PATENTS

- 2006 Oxidation-reduction sensitive green fluorescent protein variants. Remington, S.J. and Hanson, G.T. University of Oregon, US Patent No. 7,015,310
- 2006 Composition and methods for expressing reporter molecules in mammalian cells. Hanson, G.T. Invitrogen Corp. [submitted and pending]
- 2004 Compositions, methods and kits for biarsenical fluorophore labeling. Bogoev, R.A., Amshey, J.W., and Hanson, G.T. Invitrogen Corp. [submitted and pending]

PATENTS, CONT.

- 2004 Target sequences for synthetic molecules. Hanson, G.T. Invitrogen Corp. [submitted and pending]
- 2004 Compositions and methods for purifying and detecting biomolecules. Hanson, G.T. Invitrogen Corp. [submitted and pending]

PUBLICATIONS

- 2007 Hanson, G.T., Wolken, J. and Robers, M. (2007). FIAsh detection of E. coli expressed proteins in polyacrylamide gels reveals SlyD as a major contaminant. [manuscript in preparation]
- 2007 O'Grady, M., Clements, I., Thompson, D., Bazar, A., Rutten, M., Gregory, K., and Hanson, G.T. (2007). Baculovirus delivery of a GFP-basedameleon calcium sensor to primary cells and mammalian stem cells for spatio-temporal resolution of Ca^{2+} mobilization. [manuscript in preparation]
- 2007 Machleidt, T., Robers, M., and Hanson, G. (2007). Protein labeling with FIAsh and ReAsH. p. 209-220. In Giuliano, K., Taylor, D. L., and Haskin, J. (Eds.), *Methods in Molecular Biology*, Totowa, NJ
- 2006 Riddle, S., Vedvik, K.L., Hanson, G.T. and Vogel, K.W. (2006). TR-FRET kinase assays using physiological protein substrates: applications of terbium-fluorescein and terbium-GFP FRET pairs. *Analytical Biochemistry* **356**: 108-116.
- 2005 O'Grady, M., Hanson, B.J., Bunting M., Raha, D., and Hanson, G.T. (2005). Combining RNA interference and kinase inhibitors against cell signalling components involved in cancer. *BMC Cancer* **5**: 125.
- 2005 O'Grady, M., Hanson, G., Pollok, B., Raha, D., Hough, S., Wiederholt, K., Bunting, M., and Welch, P. (2005). New technologies to accelerate small-molecule screening of cell signaling pathways. *Pharmaceutical Discovery* 38-43.
- 2004 Park, H., Hanson, G.T., Duff, S.R., and Selvin, P.R. (2004). Nanometer localization of single ReAsH molecules. *J Microscopy* **216**: 199-205.
- 2004 Remington, S.J., Hanson, G.T., Canon, M., Aggeler, R., Oglesbe, D., Capaldi, R.A., and Tsien, R.Y. (2004). Third-generation GFP biosensors for real-time readout of pH and redox potential in living cells, p. 1-12. In Savitsky, A.P., Brovko, L.Y., Bornhop, D.J. Raghavachari, R., and Achilefu, S.I. (Eds.), *Genetically Engineered and Optical Probes for Biomedical Applications II*, Bellingham, WA.

PUBLICATIONS, CONT.

- 2004 Blommel, P., Hanson, G.T., and Vogel, K.W. (2004). Multiplexing fluorescence polarization assays to increase information content per screen: Applications for screening steroid hormone receptors. *J Biomol Screen* **9**: 294-302.
- 2004 Dooley, C.T., Dore, T.M., Hanson, G.T., Jackson, W.C., Remington, S.J., and Tsien, R.Y. (2004). Imaging dynamic redox changes in mammalian cells with green fluorescent protein indicators. *J Biol Chem* **279**: 22284-22293.
- 2004 Hanson, G.T., Aggeler, R.J., Oglesbe D., Canon M., Capaldi, R.A. Tsien, R.Y. and Remington, S.J. (2004). Investigating mitochondrial redox potential with redox-sensitive green fluorescent protein indicators. *J Biol Chem* **279**: 13044-13053.
- 2003 Keppetipola, S., Coffman, A., Kang, D., Voza-Brown, L., Pfau, J., Hanson, G., Yim, H., and Kudlicki, W. (2003). Rapid detection of *in vitro* expressed proteins using Lumio™ technology. *Focus* **25**: 7-11.
- 2002 McAnaney, T.B., Park, E.S., Hanson, G.T., Boxer, S.G., and Remington, S.J. (2002). Green fluorescent protein variants as ratiometric dual emission pH sensors. 2. Excited-state dynamics. *Biochem* **41**: 15489-15494.
- 2002 Hanson, G.T., McAnaney, T.B., Park, E.S., Rendell, M.E.P., Yarbrough D.K., Chu, S., Xi, L., Boxer, S.G., Montrose, M.H., and Remington, S.J. (2002). Green fluorescent protein variants as ratiometric dual emission pH sensors. 1. Structural characterization and preliminary application. *Biochem* **41**: 15477-15488.
- 2002 Capaldi, R.A., Aggeler, R., Gilkerson, R., Hanson, G., Knowles, M., Marcus, A., Margineantu, D., Marusich, M., Murray, J., Oglesbee, D., Remington, S.J., and Rossignol, R. (2002). A replicating module as the unit of mitochondrial structure and functioning. *Biochim Biophys Acta* **1555**: 192-195.
- 2002 De Giorgi, F., Lartigue, L., Bauer, M.K., Schubert, A., Grimm, S., Hanson, G.T., Remington, S.J., Youle, R.J., Ichas, F. (2002). The permeability transition pore signals apoptosis by directing Bax translocation and multimerization. *FASEB J* **16**: 607-609.
- 1999 Elsiger, M.-A., Wachter, R.M., Hanson, G.T., Kallio, K., Remington, S.J. (1999). Structural basis of spectral response of green fluorescent protein variants to changes in pH. *Biochem* **38**: 5296-5301.

PUBLICATIONS, CONT.

- 1998 Wachter, R.M., Elsliger, M.-A., Kallio, K., Hanson, G.T., Remington, S.J. (1998). Structural basis of spectral shifts in the yellow-emission variants (YFPs) of green fluorescent protein. *Structure* **6**: 1267-1277.

PRESENTATIONS & POSTERS

- 2006 Hanson, G.T. Live cell & organelle imaging: Premo™ multicolor applications in cell biology & live cell Ca²⁺ studies. *National Institutes of Health*. Bethesda, MD November 14, 2006.
- 2006 Beachem, D., Hanson, G.T., Batchelor, R., Dzubay, J., Clements, I., Thompson, D., Bazar, A., Rutten, M., Gregory, K., and O'Grady, M. (2007). Premo™ Biosensors and Organelle Lights™: Content and Delivery for Cellular Analysis. *Society for Neuroscience*. Atlanta, GA October 14-18, 2006.
- 2006 Hanson, G.T. Combining RNA interference and kinase inhibitors against cell signaling components involved in cancer. *Drug Discovery Technology & Development*. Boston, MA August 8, 2006.
- 2005 O'Grady, M., Hanson, B., Lasky, D., Kopp, A., Turek-Etienne, T., Raha, B., Hanson, G., and Wong, T. (2005). Linked Technologies for Interrogating the Epidermal Growth Factor Receptor Pathway. *Drug Discovery & Development Asia Pacific meeting*. Singapore June 1-3, 2005.
- 2005 O'Grady, M., Hanson, G., Honer, J., Bercher, M., Bunting, M., Tsang, A., and Hanson, B. (2005). Analysis of JAK-STAT Signaling Pathways Using CellSensor and Stealth RNAi Technologies. *Drug Discovery & Development Asia Pacific meeting*. Singapore June 1-3, 2005.
- 2005 O'Grady, M., Hanson, B., Hanson, G. and Raha, D. (2005). Combining targeted agents against cell signaling components involved in cancer: Beta-lactamase's robustness and versatility as a functional cell-based reporter. *Miami Nature Biotechnology Winter Symposia*. Miami, FL Feb. 5-9, 2005.
- 2004 Hanson, G.T. Fluorescent protein applications in lead discovery: An early phase drug discovery program for Huntington's disease. *Fluorescent Proteins in Drug Development*. La Jolla, CA Nov. 15-16, 2004.
- 2004 Hanson, G.T. Why is GeneBLAzer® the best cellular reporter system? *Society for Biomolecular Screening*. Orlando, FL Sept. 11-15, 2004.

PRESENTATIONS & POSTERS, CONT.

- 2004 Hanson, G.T., Strachan, B.A., and O'Grady, M. Comparison of cellular reporter systems: GeneBLAzer[®] and luciferase. *Society for Biomolecular Screening*. Orlando, FL Sept. 11-15 2004.
- 2003 Bernadino, A., Janney, N., Leong, L., Bogoev, R., Duff, S., Frimpong, K., Hanson, G., and Welch, P. Mammalian Lumio[™] System: Accurate real-time detection of expressed proteins in live cells. *Gene Expression and Proteomics Symposium*. San Diego, CA October 2003.
- 2003 Huwiler, K.G., Hanson, G.T., Hoffman, R.L., Qureshi, S.A., and Hayes, S.A. Concordance of small molecule screening data using cell-based vs. biochemical nuclear hormone receptor assays. *Society for Biomolecular Screening*. Portland, OR Sept. 21-25 2003.
- 2003 Hanson, G.T. Developing a fluorescence polarization assay for HTS. *Wisconsin Symposium III: From DNA to Molecular Medicine*. Madison, WI May 20-23, 2003.
- 2003 Eliason, H., Shekhani, M.S., Robers, M., Vogel, K.V., Hanson, G.T., Vedvik, K., Ruttimann-Johnson, C., Qadir, N., Lyle, K., and Fox, B. Use of biarsenic labels to monitor protein-protein interactions. *American Chemical Society*. March 23-27, 2003.
- 2002 Robers, M., Van Herwynen, J., Ruttimann-Johnson, C., Hanson, G., Vogel, K., Wadsworth, C., Vedvik, K., Van Calligan, M., Fox, B.G., Lyle, K., and Haas, J. Analysis of holo-ACP and applications for a novel site-specific labeling technology. Europe 2002.
- 2002 Hanson, G.T., Vogel, K.V., Lasky, D.A., Halbleib, C.M., Qadir, N., Eliason, H.C., and Shekhani, M.S. Novel fluorescence based protein labeling methods: LRET & FIAsH. *Drug Discovery Technology*. Boston, MA. Aug. 4-9, 2002.

REFERENCES

(Available upon request)